

Message

From: Terry, Robert [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=C02F0BBAADAC4B5AB42C2D5BBCF20465-RTERRY03]
Sent: 5/17/2013 4:13:54 PM
To: Stensby, David [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7f3ea928a8db486b95b1f758507a38de-DSTENSBY]
CC: Kennedy, John [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=Af1a3bc637bd4e82b7bfe77e2ae4ceb1-JKENNEDY]
Subject: RE: Treasure Island: Draft Radiological Scoping Surveys Basewide Radiological Management Work Plan DCN ITSI-0808-006-0014 dated April 2013

Yes, I'm in the office all day today. I will also be in the office next week on Monday and Tuesday, and Wednesday morning.

From: Stensby, David
Sent: Thursday, May 16, 2013 5:33 PM
To: Terry, Robert
Cc: Kennedy, John
Subject: RE: Treasure Island: Draft Radiological Scoping Surveys Basewide Radiological Management Work Plan DCN ITSI-0808-006-0014 dated April 2013

Thanks Rob,

Are you in the office tomorrow? I may stop by to discuss for a minute if you are around. I need to read through this again as it's not my area of expertise. I really appreciate you doing this on short notice.

From: Terry, Robert
Sent: Thursday, May 16, 2013 5:22 PM
To: Stensby, David
Cc: Kennedy, John
Subject: Treasure Island: Draft Radiological Scoping Surveys Basewide Radiological Management Work Plan DCN ITSI-0808-006-0014 dated April 2013

On your request, I have reviewed the Draft Treasure Island Radiological Scoping Surveys Basewide Radiological Management Work Plan DCN ITSI-0808-006-0014 dated April 2013. The document was prepared for the Navy BRAC Program Management Office West in San Diego by ITSI Gilbane of Walnut Creek. The document does not include the Sampling and Analysis Plan (SAP); that plan was to have been sent under separate cover. The document also does not include either data quality objectives (DQOs) or MARSSIM-based survey designs.

I expect that the DQOs will be driven primarily by the radiological screening criteria that are listed in Table 3.2, and based on the U.S. Nuclear Regulatory Commission's Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*, dated June 1974 and reviewed December 2011. The contractor has supplemented the rationale for use of the contamination limits in Reg Guide 1.86 by equating a 10^{-4} risk level to an annual radiation dose rate of 5 mrem/year (residential scenario), and performing calculations using RESRAD-Build Version 3.50. Although the contractor has not chosen to base contamination limits on EPA's preliminary remediation goals (PRG) calculator at <http://epa-prgs.ornl.gov/radionuclides/> (soil) and <http://epa-bprg.ornl.gov/> (building surfaces), EPA Region 9 has accepted Reg Guide 1.86 and RESRAD-Build from the Navy as decontamination limits in the past, and the Navy's contractors have performed the associated remedial actions and final status surveys with excellent result.

In spite of the absence of either DQOs or a survey design, the document outlines, but does not describe in any detail, the procedures and methods that ITSI Gilbane will use in collecting data to support the radiological clearance of buildings, structures and land areas at the former Naval Station Treasure Island (NSTI), that have been designated as radiologically impacted. The document references a Performance Work Statement that the Navy submitted on July 12, 2012, and amended on August 17 and August 23, 2012.

The document addresses 13 potentially radiologically impacted locations that the Navy identified in a Historical Radiological Assessment (HRA) that was prepared by Weston Solutions and submitted in February 2006, and in a Supplemental Technical Memorandum that was prepared by Tri-Eco and Tetra Tech EMI, and submitted in August 2012. Potential radionuclides of concern (ROCs) are Cs-137, Ra-226 and Th-232. The 13 potentially impacted locations are enumerated with their associated ROCs in Tables 2.1, 2.2 and 2.3. Those 13 locations were, or might have been, affected by (1) ship repair or solid waste disposal operations; by (2) releases that were incidental to training; or by (3) spills or other contamination that resulted from handling contaminated soils associated with Installation Restoration (IR) Site 12. Those 3 contamination scenarios constitute the conceptual site models (CSMs) that will serve as the basis for the survey and remediation procedures that the contractor will present at some later date. Releases that might have been incidental to training include those from the mockup USS Pandemonium that has been described several times over the past few months in the local news.

I do not recall that I have previously reviewed any of the earlier Navy/contractor documents that the current document references.

Recommendations

Although the document provides an outline for a survey work plan and much of the boilerplate and supporting documents that typically are submitted with work plans, it provides very little detail. The Executive Summary states from the outset that the document does not include either a Sampling and Analysis Plan, or Data Quality Objectives, or a survey design or survey plan, stating only that those items will be supplied under separate cover. Lacking these elements, I am hard pressed to discern the purpose of the present document, unless it is to gather the supporting documents and present them with the hope of finding out if the preliminary work that the consultant has completed to date conforms to reviewers' expectations. In that regard, it does seem from my reading of the current document that the consultant can be expected to produce a site contamination survey that will accurately describe the current state of remaining radioactive contamination at Treasure Island.

I would also like to suggest that the Navy's consultant also consider supplementing the radiological screening criteria that it has presented in Table 3.2 with calculations from EPA's PRG calculator (soil) and Building PRG calculator (building surfaces).

In addition, the Navy's consultant should be aware that EPA's understanding of the equivalency of risk and radiation dose is not based directly on the 1988 findings that were published in the 4th National Academy of Sciences *Report on the Biological Effects of Ionizing Radiation* (typically known as BEIR IV), which provided several risk coefficients for ionizing radiation doses, that were based on both relative risk and absolute risk models. Although the report did not recommend any single risk coefficient for use in public policy decisions, after that report was published many health physicists routinely associated a risk rate of 7% per 100 rem (0.07 per 100 rem) with both chronic and acute radiation doses. That practice is consistent with two OSWER directives that were published in 1997, EPA-R-97-013/OSWER 9335.0-69 *Rules of Thumb for Superfund Remedy Selection* and OSWER 9200.4-18 *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*.

Using 7% per 100 rem in the 30 yr residential exposure scenario, health physicists generally inferred that a risk rate of $1\text{E-}4$ was associated with an annual dose rate of 5 mrem/yr as follows:

$$\frac{1 \times 10^{-4}}{0.07/100 \text{ rem} \times 1 \text{ rem}/1000 \text{ mrem} \times 30 \text{ yr}} = 4.76 \text{ mrem/yr or approximately } 5 \text{ mrem/yr}$$

and $5 \text{ mrem/yr} \times 30 \text{ yr} \times 1 \text{ rem}/1000 \text{ mrem} \times 0.07/100 \text{ rem} = 1.05\text{E-}4$ or approximately 10^{-4}

However, even though EPA has accepted an equivalency of 5 mrem/yr with a risk of 1×10^{-4} in the residential scenario many times in the past, the Agency does not use a risk coefficient of 7% per 100 rem in calculating the risk from radiation doses, or from exposure to radioactive contaminants. Instead, the slope factors in the Health Effects Assessment Summary Tables (HEAST) are based on information that's published in Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentration, and Dose Conversion Factors for Inhalation, Submersion, and Ingestion* (EPA 520/1-88-020, September 1988); Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water and Soil* (EPA 402-R-93-081, September 1993); and Federal Guidance Report No. 13, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides* (EPA 402-R-99-01, September 1999).

Federal Guidance Report No. 13 (1999), in particular, combines an age- and gender- adjusted risk coefficient of 8.46% per 100 rem (0.0846 per 100 rem) with radiation dose estimates for inhalation and ingestion that are calculated using the dosimetry models in ICRP Publication 30, *Limits for Intakes of Radionuclides by Workers* (International Commission on Radiation Protection, 1972). The slope factors are further adjusted by information that's taken from a variety of reports;

that additional detail can be found in the discussion in Federal Guidance Report No. 13, at <http://www.epa.gov/radiation/docs/federal/402-r-99-001.pdf>.

The risk/dose coefficient of 8.46%/Sv, or .0846/100 rem, that is currently in use by EPA, can be found on p. 182 of FGR 13. Since a risk coefficient of 8.46% per 100 rem was used to produce the slope factors in the current HEAST tables, I recommend using the same risk coefficient when associating risk with any calculated radiation dose in the CERCLA context, as follows:

$$\frac{1 \times 10^{-4}}{0.0846/100 \text{ rem} \times 1 \text{ rem}/1000 \text{ mrem} \times 30 \text{ yr}} = 3.94 \text{ mrem/yr or approximately } 4 \text{ mrem/yr}$$

and $4 \text{ mrem/yr} \times 30 \text{ yr} \times 1 \text{ rem}/1000 \text{ mrem} \times 0.0846/100 \text{ rem} = 1.02\text{E-}4$ or approximately 10^{-4}

EPA's PRG calculator continues to evolve, and in some cases uses a combination of slope factors that are derived using either ICRP Publication 30 or the more recent ICRP Publications 60 (1991), 68 (1994), 69 (1995), 71 (1995) and 72 (1995). Some of those publications have now also been superseded.

In fact, FGR 13 will soon be superseded by *EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population* (EPA 402-R-11-001, April 2011), generally referred to as the *Blue Book*, which can be found at <http://epa.gov/radiation/assessment/blue-book/index.html>. The Navy's contractor should pay particular attention to Section 7 on p. 127. Final adoption of the findings in the Blue Book will most likely result in a new FGR and the new dosimetry and risk coefficients will be incorporated into the PRG calculator. Using an anticipated new risk coefficient that's about 35% higher than .0846/100 rem, one can expect that the new target annual dose limit will be closer to 3 mrem/yr than 4 mrem/yr.

Based on my reading of previous building contamination surveys that the Navy's contractor submitted for Hunter's Point Naval Shipyard, I have every reason to expect that, even using the updated risk coefficients, the values that are provided in Reg Guide 1.86 will continue to result in projected radiation doses that fall within EPA's risk management range of 1×10^{-4} to 1×10^{-6} , provided that the NRC release criteria are correctly applied.